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On the Use of Currency Reform in Inflation Stabilization

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Preliminary

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Introduction

A successful deceleration of inflation will not by itself promise a future of monetary stability. That requires fiscal balance over the longer run and monetary discipline in each short run. The macroeconomic literature on inflation stabilization nonetheless tends to devote more attention to the problems of bringing down the inflation rate than to those of keeping it down -- perhaps because the former seem more technocratic and less fundamentally political than the latter.

Since the rational expectations approach became prominent in the 1970's, credibility has become a central concept in almost all discussions of disinflation strategies. If the policy making authorities have or can establish credibility, it is often argued, they will be able to bring private sector inflation expectations into line with their policy targets and thus to avoid the contractionary consequences of a disinflationary policy that is less than fully anticipated. Credibility, therefore, seems to hold out the prospect that inflation might be quickly and drastically reduced without serious unemployment consequences. This prospect is at its most alluring for countries suffering such high inflation rates that policies of gradual disinflation in any case seem hopeless -- even though

under those conditions the credibility of the authorities has very likely already been expended.

Even with credibility, however[1], disinflation will redistribute wealth from debtors to creditors on outstanding contracts and give rise to unemployment through pre-existing labor contracts and through disruptions of credit. To abandon gradualism for a "shock"-policy remains a gamble, therefore, even if the shock can be made credible, for one can never depend upon all private contracts being by mutual consent renegotiated so as to eliminate these consequences. The "memory" of past inflation embedded in contracts thus imparts inertia to the ongoing inflation.

In its 1985 "Austral Plan," Argentina included a type of currency reform which, under certain conditions, can be quite helpful in overcoming these problems. Variants of this reform have subsequently been tried by Brazil and by Peru and its possible use has been discussed also elsewhere. The conditions under which this type of currency reform can be recommended are not generally well understood, however. They are explored in this paper.

"Bluebacking"

The particular kind of currency reform considered here we call the "blueback" scheme referring to an example previously used to illustrate the idea.[2] This illustration may as well be made to serve once more:

Imagine an inflation corresponding in all essential respects to the assumptions of the neoclassical model of a fully anticipated inflation. For simplicity, take the case of a constant inflation rate. The aggregate price level increases at the same rate as the money supply; individual prices grow

at the same rate on average, although relative prices may show somewhat larger variability since nominal price adjustments need not be synchronized. Apart from possible effects of this kind, the inflation simply constitutes an $\pi\%$ tax on cash-balances and it has no other social or economic consequences than those attributable to this tax. We may refer to it as a "quasi-neutral" inflation.

In this economy, a variety of contracts will exist but they will have one feature in common: all have been concluded on the firm expectation, shared by all parties, that the inflation will continue at the $\pi\%$ rate indefinitely. In this setting, the parties are able to calculate the anticipated real value of a future dated nominal payment without ambiguity.

Call the existing monetary unit the "greenback." The real purchasing power of greenbacks depreciates at the perfectly stable rate of $\pi\%$ per period.[3] A stable money of constant purchasing power, therefore, would appreciate relative to the greenback at $\pi\%$ per period. Consider then the simple expedient of introducing a new currency (the "blueback") which by law grows in its capacity to extinguish greenback debt at $\pi\%$ per period.

On the day of this reform, bluebacks and greenbacks exchange at a one-to-one rate. But one period later, one blueback legally discharges a debt of $1+\pi$ green units and t periods later, of course, the relationship is:

$$B = G/(1 + \pi)^t$$

Thus, if the inflation rate is 15%, for instance, a debt of 1 green dollar due ten periods hence will be extinguished at that time by the payment of approximately 19 blue cents. If the purchasing power of blue money has been kept constant in the interim, the creditor is then receiving in real

purchasing power exactly what he expected to receive before the currency reform was put into effect.

What that would mean, of course, is that nothing at all is done about the depreciation in the greenback's purchasing power. The greenback inflation continues as before (although it will eventually become unobservable). And this is as it should be for, under the assumptions of the neoclassical anticipated inflation model, it would be irrational, destructive policy to force the green inflation rate down. All agents have fully adjusted to it, all contracts and agreements embody a firm belief in its continuance. A policy of disinflation that goes against these firmly and unanimously held expectations can only wreak havoc of the worst kind.

What the blueback scheme aims to accomplish, therefore, is simply to replace the green money that is subject to the π% inflation tax with blue money that is not to be taxed in this way. If the exercise is to succeed, however, not only must prices stabilize at once but the generally shared expectation, after the reform is announced, must be that they will remain constant indefinietly. For this to be possible, several requirements have to be met.

First, since the reform is predicated on elimination of the inflation tax, the government must either replace its inflationary seigniorage with other taxes or else reduce expenditures so as to produce a budget that is consistent with the indefinite pursuit of a non-inflationary policy.[4] If nothing is done about the pre-existing deficit, so that it has to be covered by printing bluebacks, this would contradict the announced stabilization. If, then, the blueback goes to an inflation rate of π%, greenback claims (having been subject to the conversion) will depreciate in real purchasing

power at a $2\pi\%$ rate, implying a redistribution of wealth in favor of debtors equally as arbitrary and equally as large as the redistribution in favor of creditors that the blueback reform is intended to prevent.

Second, since green money is taxed and blue is not, the green money will very quickly disappear from circulation. But the amount of real balances demanded of the non-taxed money is going to be larger. The authorities must accommodate this increased real demand by allowing the nominal money supply to increase in order to avoid deflationary pressure on the blue price level and consequent adverse effects on employment.

Another requirement for the scheme to be successful, namely government credibility, is built into the initial conditions of the model. For an inflation to be "fully anticipated", the government must be committed to maintaining it at the anticipated rate and this commitment must be utterly credible not only as to intent but as to result. In this context, therefore, we may suppose that agents redefine their expectations immediately to match the announced new fiscal and monetary policies, and that each agent is perfectly confident that all others will do likewise[5]. This behavior of private sector expectations, in turn, will be confirmed by the simultaneous, coordinated halt to price increases which is itself compatible with the government's new stabilization program.

In this somewhat abstract context, the blueback idea serves mostly as a conceptual tool to diagnose the crippling limitations of the anticipated inflation model. If real world inflations were "like" the inflation model, they could be cured overnight by bluebacking. All the agonizing over the dangers of various disinflation strategies would be pointless. Reducing the inflation rate is as simple as cutting an excise tax. Within the model,

things are that simple because it represents the inflation process as a peculiar form of absolutely perfect monetary stability -- peculiar in that it does not offer stable purchasing power but instead a stable rate of depreciation of purchasing power. Implicitly, it assumes a completely believable precommitment by the government -- indeed, a precommitment extending to future governments -- to produce a particular inflation path and not to deviate from it.

The blueback trick works because we start from a policy regime of the most exacting discipline and only the rate of inflation needs changing. Under the conditions assumed this is easily done. The scheme has the virtue of making it clear that in actual inflations it is not the rate but the regime that is the problem.

At the same time, the regime of the anticipated inflation model, which makes the blueback scheme work, bears so little resemblance to actual inflationary regimes that it comes as a surprise that the scheme would ever be of any real use.

Indexed Contracts

The "fully anticipated" inflation would not give agents reason to avoid nominal contracts. It is only a small step in the direction of real world inflations, however, to admit sufficient uncertainty so that at least some indexed contracts are concluded. Because price indices are compiled only at discrete intervals and published with some delay, indexed contracts will tend to have an inertial component, since payments will be adjusted using lagged rather than fully contemporaneous changes in the index in question. For low or moderate inflations this inertial component of index contracts

will be of quite minor consequence. In the case of very high inflations -- the inflations for which a currency reform is most likely to be part of a stabilization plan -- the proportion of the real value of a contract that is not corrected by the index can be quite substantial.[6]

The blueback scheme can be extended in a relatively easy way to indexed contracts. Let t be the date of the currency reform and consider a contract arranged at date t-i calling for payment at t+j. In writing the contract, we suppose, the parties were trying to arrange a payment of agreed-upon real "base value". Let the corresponding nominal value at t-i be V_o "green dollars." The contract specifies a certain price index, I, as the means by which the nominal payment is to be adjusted for inflation so as to maintain its real base value. At date t-i the latest available value for I was k "days" old[7] and we may suppose that the same length of lag was anticipated to occur at t+j. Thus the contractual payment in greenbacks will be

$$G_{t+j} = V_o(I_{t+j-k}/I_{t-i-k})$$

The currency reform should seek to preserve the real value of contracts as of the date of the reform. Just before the stabilization, at t, this payment will have an expected real value (at time t prices) of[8]

$$E_t(V_f) = V_o \frac{E_t(I_{t+j-k})}{I_{t-i-k}} \cdot \frac{1}{(1+\pi)^j}$$

Note that for some contracts outstanding at t, the date t+j-k on which the index used in the adjustment of payments was last measured can be earlier than t (i.e., $j-k < 0$). In this instance, the payment G_{t+j} is treated as a pre-determined sum in greenbacks which is to be converted into blue money at the factor for date t+j, namely $1/(1+\pi)^j$. The blueback payment would then be

$$B_{t+j} = G_{t+j}/(1 + \pi)^j$$

with a real value of

$$B_{t+j} = V_o \frac{I_{t+j-k}}{I_{t-i-k}} \frac{1}{(1 + \pi)^j}$$

The conversion thus corrects for the unforeseen shift in the inflation rate at t and makes the real payment equal to the value expected at that date.

The second case is somewhat more complicated. Suppose that, since the date of the reform, price indices are measured in stable monetary units (that is the indices are computed from collected prices quoted in bluebacks). If, then, the reform failed to require a correction for the lag in the indices, the contract would require a payment of

$$B^u_{t+j} = V_o \frac{I_{t+j-k}}{I_{t-i-k}} = V_o \frac{I_{t+j-k}}{I_t} \frac{I_t}{I_{t-i-k}}$$

The right-hand expression makes clear the consequences of the indexing lag: the adjustment formula is based on the movements of the index over i+k "days" of high inflation (between t-i-k and t) and j-k days of low inflation (between t and t+j-k), while between the original date of agreement and the payment date there were actually i days before the reform and j days after. Thus the lag "carries forward" the correction for the pre-reform inflation rate to payments to be made after prices have been stabilized. More precisely, the real value of the payment that was originally expected can be written:

$$E_{t-i}(V_f) = V_o \frac{E_{t-i}(I_{t+j-k})}{I_{t-i-k}} \frac{1}{(1 + \pi)^k}$$

because the inflation expected to take place between t+j-k and t+j was $(1+x)^k$.

If, therefore, the reform specifies that the payment in bluebacks is to be calculated as

$$B^{c}_{t+j} = B^{u}_{t+j}/(1+\pi)^{k}$$

(i.e., making the conversion into the new currecy using the blue/green exchange rate for date t+k, since k is the lag of the indexing formula), the sum due will be:

$$B^{c}_{t+j} = V^{o} \frac{I_{t+j-k}}{I_{t-i-k}} \frac{1}{(1+\pi)^{k}}$$

and the correction made will prevent an unintended real wealth transfer from the debtor to the creditor.

The calculation assumes that the authorities imposing the reform know what inflation rate is generally expected at time t: $E_{t}(\pi)$, and use this rate for the conversions. If this rate were different from the one originally anticipated, $E_{t}(\pi) \neq E_{t-i}(\pi)$, the correction will, of course, not restore the originally anticipated real value to the contract. This illustrates a general feature of the blueback reform, namely, that capital gains and losses incurred prior to t are treated as "bygones" --the reform only prevents those that would be brought about by the abrupt stabilization.[9] Similarly, if the index chosen by the contracting parties has diverged from some more generally accepted deflator for "real purchasing power", the reform treats this as a realization of a relative price risk accepted by the parties at the outset and a feature of the contract, therefore, that should not be interfered with. Finally, the actual and originally expected real values of the payment may fail to coincide because of relative price changes that occur due to the stabilization itself.

Although a correction for these may be desirable in principle, it is almost certainly not feasible in practice.

Credibility

The assumption of complete credibility on part of the monetary authorities may fit naturally into the neoclassical model of fully anticipated inflation, but it seldom if ever fits the actual circumstances surrounding very high inflations. We have used this assumption above in explaining the elemental principles of the blueback reform but, as we proceed (ever so cautiously) in the direction of greater realism, it needs to be reconsidered.

To see how it enters in, consider some of the features of the conversion mechanism:

The reform pre-determines the "crawling exchange rate" between the two currencies -- or, equivalently, the proportional discount to be applied to previously contracted nominal payments -- for dates beyond t^{10}. In practice, the conversion rate need not be announced in advance for all time to come; leaving the conversion rate beyond some horizon date "to be announced later" offers some protection against the risk that a later resurgence of inflation will distort the real outcome of the reform. Still, the rate must initially be set for some period ahead. The conversion, then, only acts "neutrally", as intended, if the price level effectively stops rising during the time for which the conversion rates have been pre-announced.

As long as price level stability is maintained, the conversion will act only on nominal values of payments, irrespective of the nature of the originating contract. The uniform deflation of nominal values does not

otherwise modify agreements previously made -- the "real" provisions of contracts are left unchanged. Note, in particular, that interest rate differentials are maintained.

Whether the price level can be stabilized, even if only for a transitional period, depends in large part on whether people believe it will be stabilized. In order for the blueback scheme to be viable, it is probably necessary that the public is confident that large wealth redistributions will in fact be avoided. This can only be the case if it is quite clear that inflation will stop, at least for some time.[11] The stabilization of expectations is obviously a condition for spot prices (and other prices not fixed by earlier contracts) to stabilize. But is is also required in order to deal with already outstanding contracts if strong public resistance to the conversion scheme is to be avoided.

The announcement of credible fiscal and monetary measures that will be seen to avoid the monetization of fiscal deficits over the conversion period is, in all probability, a necessary condition for private sector nominal expectations to stabilize. But such measures may not be sufficient. In the actual circumstances of high inflation, people are apt to use a variety of inflation "theories" as bases for forming their inflationary expectations; the government may need to provide a corresponding variety of "anchors" for their expectations. Some kind of transitional incomes policies -- even a general price freeze -- may be required in order to signal the strong commitment of the authorities to "enforce" a period of price stability to match the conversion that it is imposing on private contracts.[12]

Contracts in high inflations.

High inflations are not steady processes. Typically, the "average" inflation rate and relative prices are both highly variable. Although people spend much time and effort gathering information, they are unable to anticipate price movements with any precision. Their uncertainty about the real value of nominal sums blows up very rapidly with distance from the present. Effective planning horizons become very short. They know that their best inflation forecast for the month ahead can very easily be off by several percentage points. The very meaning of "the" inflation rate is blurred for them by the volatility of relative prices. The likely forecast error cumulates to much larger figures[13] as they look further ahead so that nominal contracts made over anything but very short periods appear forbiddingly risky.

In high inflations, agents have several options: they can simply avoid certain transactions, they can choose to make shorter contracts or they can rely on indexing clauses. In fact, all of these strategies are to be observed, in different combinations depending upon the concrete situation. But, no matter what strategies are adopted, the real effects of price instability cannot be eliminated.

For some kinds of transactions, renegotiations are particularly costly. In the case of housing rentals, or recurrent customer-supplier relationships and, in particular, labor contracts, the parties will normally want an agreement that covers more than just a few weeks or months.[14] Since, in a high inflation, expected errors in predicting the price level over periods of such length are large, there is practically no alternative to indexing for "long" contracts of these types.

There are several problems with indexing, however. One of them, obviously, is the choice of the basket of goods whose price will be used to adjust the value of payments, when there are several available proxies for "the" price level. People are then led to take implicit bets on the performance of indices, a "speculative" activity most often unrelated to the main purpose of the transaction. Although most contracts are linked to indices such as the CPI, a variety of other formulas are also found in use; this diversity may reflect the existence of inconsistent forecasts of relative price movements.

The reporting lag is another complication. Indexing is backward-looking, which means that the purchasing power of payments changes when the inflation rate fluctuates. There are, of course, prices (such as the exchange rate) that are almost continuously measured, so that contemporaneous indexing could be obtained by linking to those prices. But "dollarization" of contracts has drawbacks since the real exchange rate is apt to be volatile in high inflations. For most people, maintaining constant purchasing power over a basket of foreign goods is of little or no help if, in so doing, their command over the domestic goods that are the stuff of daily existence is rendered more variable.[15] Typically, dollarization only becomes a more or less universal practice in the limiting case of true hyperinflation, when the variability of inflation has become extreme, and when the prices of domestic goods also tend to be quoted in terms of foreign currencies.

Shortening the length of contracts is a natural response when information about future conditions is very unreliable. For short horizons, indexation is of little use since (given the lags in obtaining and using the

indices) a simple adjustment using the past inflation rate will do as well. Short contracts, then, are written in nominal terms, and incorporate the price expectations of the transactors. In erratic inflations, individuals are likely to form quite different expectations from one another. There is then no clearcut way to establish what "real" result was anticipated by the parties to a contract and no possibility of establishing an objective standard of fairness that could be imposed by the courts. Given the heterogeneity of expectations, the real outcome cannot possibly fulfill them all.

Some contracts take a "mixed" form, in which payments are index-adjusted at relatively long intervals, and remain fixed in nominal terms between the moments when these adjustments are made. A common practice, in some countries, is that of quarterly or half yearly wage raises linked to the past increase in the CPI, with constant money wages in the meantime. This produces a awtooth pattern in the real value of payments and can, when the index-adjustments are not synchronized, give rise to large differences in the real price of the same good or service on the same date.

High inflation economies differ from one another with regard to the way in which contracts are typically made. What contracting strategies will predominate depend on the magnitude of the inflation, on the institutional structure of the country in question and also on its previous experience with monetary instability. For example, in Brazil and Israel, indexation was formally introduced in a wide variety of financial contracts (see Simonsen [1983], Fisher [1985]). In Argentina, although indexing was often used[16], it was much less widespread. Instead, financial assets were held mostly in the form of very short-run nominal instruments or foreign

currencies[17]. Also, while in Brazil (with an inflation rate on the order of 15% per month at the beginning of 1986) non-synchronous wage-adjustments based on an explicit indexing formula were made every six months, the practice in Argentina by early 1985 (when the inflation rate oscillated between 20 and 30% per month) was of monthly increases, often without any explicit linkage to the CPI.

Irrespective of these differences, contracts will carry a "memory" of past conditions, be it in the form of backward looking indexation or of expectations formed at a previous date. At any given moment, there is a stock of outstanding agreements; the real value of the payments resulting from them will be affected by the history of price level changes from the dates the respective contracts were concluded. In high inflations, this memory shortens -- as the length of contracts shortens; only in hyperinflations does it reach the vanishing point.

Currency Reforms in Practice: **Argentina**

The first monetary reform of the type discussed here was that implemented as part of the Argentinian "Austral Plan" in June 1985. The system used to convert debts was directly inspired by the "blueback" scheme (cf. Heymann (1986, 1987). The Austral shock stabilization also included, among other measures, a general price-wage freeze and an end to Central Bank credits to the Treasury. The announcement of the stabilization program was by and large unexpected; private decisions made before the reform reflected the general belief that inflation would continue to run at a very high rate at least for some time to come.[18] The inflation rate (measured by CPI) had averaged 26% per month in the first half of the year, with a minimum of 21%

in February and a maximum of 30.5% in June. The stabilization attempt achieved an abrupt deceleration: through the second half of 1985, CPI growth averaged 3% per month.

The monetary reform was established by a government decree, later confirmed by Congress. Its main features were the following:

i) A new monetary unit, the Austral, was created to replace the Peso Argentino. Currency, bank current accounts and savings deposits payable on demand were converted into the new unit at a rate of 1000 pesos per Austral. Since all prices were also divided by the same factor and immediately expressed in australes, this simply took zeros off the currency. The peso became no more than a transitory unit of account for debts originally defined in that currency.

ii) Nominal obligations denominated in pesos and due after the reform date were to be settled in australes at a conversion rate that depended upon the day of payment. Initially, these rates were announced for the first 45 days following the reform and were based on a monthly depreciation rate for the peso relative to the austral of 29%.[19] (Later, new conversion rates were announced that tried to approximate the pre- vs. post-reform inflation differential). The initial conversion table was based on the assumption that, since most outstanding contracts were of quite recent origin, it was appropriate to make the peso price of the austral grow at approximately the inflation rate of the period immediately preceding the reform. The conversion scheme was to be applied to all payments resulting from contracts oustanding at the date of the reform, irrespective of the nature of the agreement, with the exception, however, that wages and

pensions were to be adjusted in June and settled in australes (at the 1000 t0 1 rate).[20] For time deposits (antedating the reform) and other obligations with an explicit interest rate, the sum payable in pesos was to be calculated as stated in the contract and then converted into australes according to the conversion scale. Thus the interest rate in australes (for the post-reform part of the time-span of a contract) would equal the difference between the nominal peso interest rate and the 29% per month growth-rate of the peso/austral conversion factor. In some instances, this calculation could result in interest rates in the new currency becoming negative; since negative real rates were often observed during the inflation, no provision was made to prevent this from occurring.

iii) The reform maintained all indexing clauses as they stood in the respective contracts. Payments calculated on the basis of index-values measured prior to the reform,[21] were to be treated as peso values and be subject to conversion into australes by the factor of the payment date. The last payment determined in this fashion would serve as the basis for future adjustments to be made according to the escalation formula incorporated in the contract. This was designed to eliminate the "carry-over" of past inflation due to indexing lags (in the way outlined above), without otherwise modifying the contents of the specific contract.[22]

As could be expected, the currency reform provoked lively debate. Interestingly enough, however, neither the general design of the conversion scheme nor the specific rate of depreciation of the old currency implicit in the conversion scheme met with much objection. In the main, the reservation

raised concerned the neutrality (or lack of it) of the conversion as applied to specific types of transactions and also the difficulties, as perceived in some quarters, in applying the mechanism to indexed contracts.[23] Among the issues raised[24] were arguments challenging the fairness of the conversion scheme for certain types of nominally determined payments. For example:

i) The reform specified that the conversion to australes be made using the factor corresponding not to the date when oayment was due but to the date when payment was actually made (after adding interest or punitive charges as specified in the contract). Many creditors found this provision to their disadvantage.

ii) Some holders of time deposits complained that, while a reduction in interest rates could have been appropriate, it was unfair to "deflate" the capital value (including accumulated interest) of deposits as was done by the reform. This complaint was more insistent in the (relatively few) cases where the conversion resulted in a negative nominal rate of return.[25]

iii) Some creditors claimed that the sums they were due to receive "did not incorporate inflationary expectations" and, therefore, should not be subject to "deflation". This argument was made for a variety of payments including, for instance, lawyers' fees (for example, Alterini [1985]).

iv) Similarly, some debtors complained that "exorbitant" nominal interest rates charged before the reform remained as high in real terms after the conversion.

Quite possibly, some objections were motivated simply by "money illusion". In general, however, the theme running through the complaints voiced was a

different one, namely, that the reform was "blind" and did not attempt to restore justice to contracts and agreements distorted by the previous inflation. Implicitly, what was demanded was a new legal avenue for the case by case "reopening" of contracts.[26] But the conversion scheme was not designed to enforce some independently defined standard of fairness on the outcomes of contracts but to replicate, as closely as possible, the real outcomes that would have resulted had the pre-reform inflation continued as expected.

The longer-term, indexed contracts did present a problem[27] since the sharp acceleration of inflation in the years preceding the Austral plan had caused significant distortions which the conversion scheme simply perpetuated. Whereas these distortions were already present before the reform, it is equally obvious that the actual terms of these contracts did not match those originally intended. This is one area in which a case by case redefinition of contract terms might possibly be attempted.[28] Actually, many contracts of this type were voluntarily renegotiated so as to more or less synchronize price adjustments with payments dates and thus avoid indexing lags. This was done, in particular, with public sector purchasing contracts.

Despite these problems and reactions, the austral conversion was on the whole uneventful and proved useful in avoiding the redistributive effects of the abrupt stabilization that would otherwise have occurred. The debate surrounding it faded away rather quickly, leaving no lasting legacy of dispute or litigation.[29]

Brazil and Peru

Shortly after the Argentine program, Brazil and Peru also attacked their inflations with "heterodox shock" programs; in both cases a conversion scheme was put into effect[30]. In Peru, the conversion scale was used only for obligations that did not carry explicit interest charges; interest rates on bank deposits and loans, on the other hand, were reduced by government dictate as from the day of the start of the plan, without resort to conversion. The Brazilian scheme was more comprehensive (see for example Pelaez (1986)). Nominal obligations were converted into the new currency (the cruzado) using a scale similar to that used in Argentina. The main difference was that the conversion factor (by which the cruzado price of the old cruzeiro grew at 14.5% per month, which approximated the inflation rate previous to the reform) was preannounced in Brazil for a period of one entire year -- with the implicit presumption that cruzado inflation would be zero over this long a period! All indexed debts (with the exception of savings accounts), most notably government bonds, were converted into cruzados at the date of the reform, with their value adjusted to that date according to the corresponding formula, and were then to remain fixed (without further indexing) in nominal terms; furthermore, indexation was forbidden for new contracts of less than one year's duration.

Wages and housing rentals, which prior to the Cruzado Plan had been adjusted through "mixed" indexed-nominal formulas, were to be converted so that their cruzado amount came to approximate in real terms their average values over the latest pre-reform period of length equal to the interval between index-adjustments. Thus, for example, wages stemming from contracts more than six months old were converted as follows: the earnings of the six

months previous to the reform were expressed in prices of the date of the reform by "inflating" the sums in question by the CPI change since the date received; the average of the values thus obtained was established as the new wage in Cruzados[31]. It may be noted that this system left open the possibility of nominal wage reductions, for contracts that had just undergone an indexing adjustment and for which, therefore, earnings were near their peaks[32].

The various conversion schemes differed in their specifics in part because the concrete problems that had to be faced were not the same: Brazil, for example, had to find a formula suitable for its system of half-yearly nonsynchronized wage adjustments whereas Argentina had to deal with monthly, simultaneous increases. But, although the reforms were of the same general type, some conceptual differences can also be identified. The Argentine scheme was more concerned to define a uniform mechanism that could be used independently of the nature of the transaction and to leave unchanged the main features of the terms established by the parties in the contracts while the Brazilian reform, for example, suspended most indexation clauses.

The preconditions for reform

The programs of which these reforms were a part did not achieve sustained stabilization: after some time, inflation rates returned again to high levels. The eventual failures have no bearing on the appraisal of the conversion schemes, however. Monetary reforms of this kind can do no more than smooth the initial transition. Experience has now shown that they can play a useful role for this purpose. The Latin-American "heterodox shocks"

could hardly have been attempted without them. Monetary reforms are neither magical solutions nor irrelevant gadgets: in the right circumstances, they can help to bring down the inflation rate with dramatic swiftness and thus make stabilization less difficult to achieve.

What then are the right circumstances? They do not make a broad class. After one is done defining the wrong circumstances, what remains is a rather narrow window of opportunity.

Both backward- and forward-looking conditions need to be considered[33]. The backward-looking questions are: How many past states of expectation, embodied in still outstanding contracts, do we have to deal with? How coherent were they (i.e., to what degree were individual expectations consistent)? By how much did they diverge from one another? Looking forward, the questions are: How far into the future do people at present have well-defined and reasonably consistent price expectations? Can we infer what they are with reasonable reliability? What future price path will the government be able to "guarantee"? For how long?

Consider, first, the two opposite cases of hyperinflation and quite moderate inflation. For hyperinflations, the blueback idea is simply irrelevant. A hyperinflation leaves no surviving legacy of the past monetary regime. A scheme designed to cope with inflationary "inertia" is superfluous when contract-embodied memory and foresight both become "the ghosts of departed quantities" (as bishop Berkeley said about derivatives). In this respect, stabilization efforts in a hyperinflation start with a clean slate[34].

For moderate inflations (in the lower double digits, say) memory and expectation are both likely to be too long. Contractual rights and

obligations acquired or entered into many years ago and/or with many years still to run will exist in large volume. Contracts that have a long term to maturity require a "greenback-to-blueback" conversion scale that extends far into the future. That prospect raises two problems. First, the government may not be able to hold any given trend of blue prices indefinitely. Of course, the rate of depreciation of green money need not be announced in advance for more than a limited period. This would retain the flexibility to adjust later for changes in the post-reform inflation rate. But a system that necessitates dictating an officially sanctioned inflationary expectation to be applied to "old" contracts long after the reform would create an unrequited focal point for political pressures of every kind and become a source of endless recriminations and disputes. Second, the choice of which inflationary expectation to legitimate becomes more and more difficult the farther into the future it has to be projected. Using the blueback scheme entails projecting a particular "expected" time-path of "green" inflation forward as the basis for calculating the real outcomes of contracts that will be established in terms of "blue" money. A monetary policy to stabilize the blue price level will then validate this particular expectation **and disappoint all others**. The question whether this can or cannot be justified is a quitessentially political one.

The blueback scheme takes the state of expectations as of the date of the reform as the one which is to be legitimized. This entails treating the capital gains and losses due to past inflation as bygones. But what people now expect and what they think they have **a right to expect** are not always the same thing[35]. Any government that itself strives for legitimacy cannot treat people's beliefs about what they may legitimately expect as "bygones,

forever bygones." Some past state of expectation, embodied in a substantial volume of still outstanding contracts, may have a better claim to legitimacy than today's expectations. People on nominal pensions, for example, may be resigned to the expectation of continued inflation but still feel strongly that they have a right to expect that the erosion in the real value of "green" pensions be stopped rather than made permanent. The heavy, complex overhang of past states of expectation will mean that gradual disinflation is preferred to shock stabilization in dealing with moderate inflations.

Between moderate and hyperinflations we are left with the high inflations which have shortened contracts and, therefore, shortened both the past and the future that has to be taken into account. But the erratic variability of high inflations that has this effect also increases the chance that agents form inconsistent expectations of the real value they agree to pay or to receive through a nominal contract. It also causes more frequent changes in these expectations as the parties reevaluate their beliefs of yesterday. For certain types of agreements, they will then take resort to index clauses, but swings in the inflation rate will cause the real outcomes of such contracts to vary as well (since the adjustment formula hardly ever uses fully contemporaneous prices). In an erratic high inflation, therefore, the status quo at the time of the stabilization does not have well-defined expectational properties. It is then unclear what standard should be applied to correct contracts -- or if this should be tried at all.

This leaves a type of high, but not too high, inflations (in the range of two digits per month, say). In addition, one needs an inflationary "plateau" of moderate variability in the inflation rate for some period

before shock stabilization is tried. This period of some stability in the inflation rate has to be fairly lengthy in relation to the contract lengths that remain common.[36] This was -- more or less -- the starting point of the three Latin American stabilization attempts in which blueback reforms were used.

Footnotes

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[1]Government credibility by itself does not necessarily solve all problems of coordinating a simultaneous and consistent deceleration of all prices. But this complication can be deferred at this point.

[2]For previous expositions of the "blueback" idea, cf. Leijonhufvud (1983a, 1983b). The idea is also used in the discussion following Leijonhufvud (1977), cf. p. 323.

[3]To speak of "stabilizing" a quasi-neutral inflation is, indeed, self-contradictory. It is more accurate, as we will argue, to think of the experiment simply as abolishing the tax on cash-balances.

[4]Under the very strong foresight assumptions made in the particular context of the anticipated inflation model, this consistency requirement can be stated simply in present value terms. A commitment by the incredibly credible government to raise the requisite tax proceeds at some future time however distant will suffice to convince agents that the present values of government expenditures and taxes are balanced. In more realistic situations, governments with a history of inflation behind them had better bestir themselves and close their flow-deficits without much delay!

[5]The "expectations of expectations" problem of Phelps, in other words, should not be of concern in the postulated context. Cf. E.S. Phelps (1983).

[6]Consider an inflation running at a monthly rate of 30%, for instance. Let the price index be compiled at monthly intervals and suppose that a contract calls for payment in mid-month. If both parties expected the inflation to continue at the 30%/month rate at least up to this mid-month date and had agreed to terms embodying a correction for this, then an abrupt stabilization would entail a redistribution from debtor to creditor amounting to 15% of the real value of the contract.

[7]Some indices do not reflect prices at a particular date but rather time averages. For these indices, we will assume that they give values equivalent to instantaneous measures at the mean date of the reporting period.

[8]$E_t(I_{t+j-k})$ denotes the value of I that the index is expected at time t to take at t+j-k; with the exceptions noted in the text (where k>j), the realization of this index cannot possibly be known at t, of course. Indeed, if the reform goes through an index value for "green prices" will never be recorded for t+j-k.

[9]It is possible that under certain conditions it might be found preferable to attempt to take into account the state of expectation at the original date of contract. As will become clear, however, this would not only create horrendous complications in procedure but, in most instances, also leave a legacy of disputes that could threaten the legitimacy of the entire stabilization plan.

[10]Other schemes to deal with contracts through monetary reform have been proposed. In particular, Arida and Lara Resende (1985) propose the issue of a new currency whose price in terms of old money would be defined by indexing to the price level in the old currency. In principle, this makes the exchange rate between the two moneys a variable rather than a pre-defined constant. This might seem to hold out the promise of escaping the need to guarantee price-level stability after the reform (although it would reintroduce the indexing lag problem if the inflation rate of the old money does not remain constant). But, since it is likely that the old (taxed) money will very quickly disappear from circulation, making the corresponding price index meaningless, the conversion rate thereafter would have to be established by fiat -- just as in the blueback scheme.

[11]At this point the reader should go back and resume reading at the beginning of the paragraph!

[12]The public will be bound by law to accept the conversion of private contracts. If this is enforced without an equally "binding" guarantee of stable "blue" prices, the reform will sow dissension and resistance. Since controls are both costly and obviously difficult to sustain for prolonged periods, this limits the length of the transition period over which the conversion scheme can be applied. Hence, the scheme is better suited for high than for moderate inflations since, in the former, contracts will be for shorter durations (see below).

We are dealing here only with the conditions under which a "blueback" reform may be successful -- not with the more general problem of the conditions for successful stabilization. The point that incomes policies may be required in order for the currency reform to be applicable is rather incidental to the case to be made for their use in "shock" programs which rests mainly on their role in coordinating the expectations and thus pricing behavior of the public. Cf., for example, Heymann (1986) and Machinea and Fanelli (1987).

[13]To quote inflation rates in percent per year strikes people living under these conditions as meaningless. When the Austral Plan was first announced, European and North-American newspapers and newsmagazines tried to explain to their readers what the situation immediately prior to the reform was like. In so doing, most of them chose to translate Argentinian inflation rates into annual figures -- and produced estimates that were up to 2000 percentage points apart!

[14]However, in hyperinflations, wage negotiations, for example, are also very short-term (for the German case, cf. Bresciani-Turroni [1937] and Schacht [1927]). This is presumably due to the difficulty of finding

indexing formulas that share the risk in a mutually agreeable manner. Nonetheless, it remains true that, as inflation increases, some types of contracts shorten much less readily than others.

[15]The markets that are first dollarized, in fact, are not the ones in which the continuous availability of an index-measure would be particularly beneficial. Dollarization tends to spread first in the sale of purchase of housing, for instance, i.e., in markets where people are making major wealth-placements for some length of time.

[16]Frenkel (1984) found that, in many cases, wages followed an (implicit) backward-looking monthly indexing rule. By mid-June 1985, salaries in the government were being adjusted by 80% of the CPI increase in the previous month.

[17]By mid-1985, 20% of interest bearing deposits in banks were indexed; the other 80% consisted of savings accounts and time deposits, mostly with 30 days maturity or less. One year later (during a period of relatively low inflation), the share of indexed deposits had declined to 3% but time deposits for 45 days or longer were still only 4% of the total. Most loans made outside the banking system carried a fixed nominal interest rate and had very short maturities (often 7 days, and almost always, less than one month).

[18]General discussions of the Austral Plan can be found, for instance, in Heymann (1986), Machinea and Fanelli (1987), and Gerchunoff and Bozalla (1987).

[19]The widely circulated "tablita" tabulated the peso/austral rates as follows:

Appendix to para. 4 of decree No. 1096/85

date	australes per thousand pesos argentinos	thousand pesos argentinos per austral
June 15	1.000000	1.000000
June 16	0.991548	1.008524
June 17	0.983167	1.017121
.....		
July 31	0.676751	1.477648

[20]Note, however, that wages were frozen following this adjustment, while for other contracts subject to conversion indexing clauses remained in effect after the reform.

[21]These included adjustments made using the June 1985 price indices on the presumption that most of that month's inflation would be due to price movements before the start of the stabilization program.

[22]As mentioned above, some contracts have a mix of nominal and indexed features. In Argentina a common example was that of rental agreements adjusted by indexation every three months but with nominally fixed payments in the intervening months. Under inflationary conditions, such contracts acquire a sawtooth pattern of real payments. The Argentinian conversion scheme for these contracts was such that, after the indexing lag was taken care of, the real payment at the "sawtooth peak" (i.e., immediately after the escalator clause had been applied) would be equal to that of the previous peak. With a lower inflation rate between indexation adjustments, this meant that the average value of payments would be higher. This matter was not crucial in Argentina; it was quite important in Brazil where this kind of contract was much more common and included most labor contracts (see below).

[23]Shortly after the reform announcement, the government had to issue clarifying norms that specified more explicitly how the adjustment lag for any given index-contract should be determined and what conversion factor should be used for the resulting payments.

[24]Much of the subsequent literature has dealt with the reform from the legal point of view. See, for example, Adrogue (1985), Eilbaum (1985), Moisset de Espanes et al. (1985), Trigo Represas (1985).

[25]The minimum interest rate for time deposits in banks just before June 15 was 28% per month, i.e., less than the 29% per month depreciation rate of the peso relative to the austral. Deposits made at the 28% rate would end up having earned negative nominal interest ex post.

[26]Contracts could of course, be renegotiated or challenged in court both before and after the reform. Through its previous experience with volatile inflations, the Argetinian judicial system had in fact evolved a "doctrina de imprevisibilidad" that allowed for the revision of contracts in the event of unforeseen price level changes. Argentine law, therefore, was not completely insistent that "a peso is a peso". This "unforeseeability doctrine" had been applied mostly in cases of inflationary accelerations.

The point of Austral reform, however, was to avoid triggering widespread litigation. The conversion scheme defined a general rule for dealing with contracts of different types which could be used as a basis either for direct agreement between the parties or, if necessary, for decisions by the courts.

[27]Initially, some people objected that since escalation clauses simply reflected price changes, indexed sums should not be converted. This objection, of course, neglected the lags built into the indexing formulas.

[28]An alternative conversion scheme might have made the conversion factor correspond, not to the inflation differential between the reform date and the payment date, but to that between the date of origin of the contract and the payment date. This kind of scheme, however, would not only be complicated by the proliferation of conversion scales (i.e., one for every contract origination date) but also by disputes over the dates at which specific obligations would be considered as having originated. Contracts that undergo partial revisions while in effect will present this kind of ambiguity and such revisions are apt to occur frequently in high inflations.

Neither the conversion scheme that was actually used nor this hypothetical alternative is entirely satisfactory for these long-lived contracts. This demonstrates again that a more or less steady inflation rate for some period prior to the reform is a condition for the scheme to be viable. How long this period of steadiness needs to be depends on the extent to which the age-distribution of outstanding contracts has been shortened by the inflation. A currency reform of the "blueback" type had better not leave more than a small subset of "long" contracts as special cases.

[29]The Argentinian inflation remained relatively low for about a year following the 1985 stabilization program. Subsequently, it accelerated sharply on several occasions. These later spurts seldom affected the contracts covered by the reform which had mostly expired. None of the later attempts to get inflation under control again used a "blueback" scheme. There were two strong reasons not to do so. First, these later efforts were less likely to achieve stability over some significant period than was the 1985 program. Second, they were in each instance preceded by periods of highly variable inflation rates so that a uniform treatment of contracts would have been far less appropriate than in the original case.

[30]The Brazilian plan is described, for example, in Cardoso and Dornbusch(1987) and in Modiano (1987). Israel disinflated abruptly in 1985, but the program did not provide for the correction of contracts. It may be that the small volume of nominal assets and the importance of dollar-linked instruments (which are in effect indexed to the exchange rate so as not to be subject to index-lag problems) made a conversion scheme more or less superfluous in this case. For a discussion of Israel's asset structure in recent years see Fischer (op cit).

[31]More precisely, this meant setting the wage in the new currency at the value

$$B_t = (1/6)\sum_{j=0}^{5} G_{t-j}(p_t/p_{t-j})^e \text{ , where } (p_t/p_{t-j})^e$$

approximates the ratio of the CPI at the moment of the reform (March 1, 1986) to that at the date of the payment t-j. Wages resulting from contracts less than six months old were converted by taking the last nominal payment (made around the date of the reform), adjusting for an estimate of the price increase between the month the contract started and March 1, 1986 and then estimating the average real value that this nominal sum would have

had in an interval of six months if prices grew at a constant rate of 14.4% per month. That is:

$$B_t = G_t\left(\frac{p_t}{p_{t-k}}\right)e(1/6)\sum_{j=0}^{5}\frac{1}{(1+\pi)^j}$$, where t-k was

the time of origin of the contract, and π the inflation rate just before the program used in the calculation. In all cases, the values obtained for wages through the conversion were increased by 8%, as a separate measure.

[32]The special increase of 8% (see the previous note) reduced the number of cases in which nominal wages actually ended up lower.

[33]Recall that the setting in which bluebacking works perfectly is the artifical one of the fully anticipated inflation model. In that context, it is assumed that the same inflation rate was expected at all past dates (relevant to contracts still outstanding at $\underline{t}$) for all (relevant) future dates, and that all these past states of expectations were "coherent" in the sense that individual agents held the same beliefs. Constancy of the inflation rate is not necessary, of course. As long as the hypothetical economy evolves along some path of perfect nominal foresight, however complicated, a blueback scheme could be devised for it.

[34]From a less narrow standpoint, of course, the hyperinflationary process which eliminates "inertia" as a "technical" problem is seen to destroy other elements of continuity as well and thus to generate a dangerous mix of social anomie and political extremism.

[35]Cf., also Leijonhufvud (1984), pp. 28-29.

[36]. In the Argentinian case, the inflation rate had stayed in the high 20's (percent/month) for about half a year prior to June 15, 1985 -- a long period compared to the 30 to 45 day deposits which were the longest purely nominal contracts existing in any substantial volume that were to be bluebacked.

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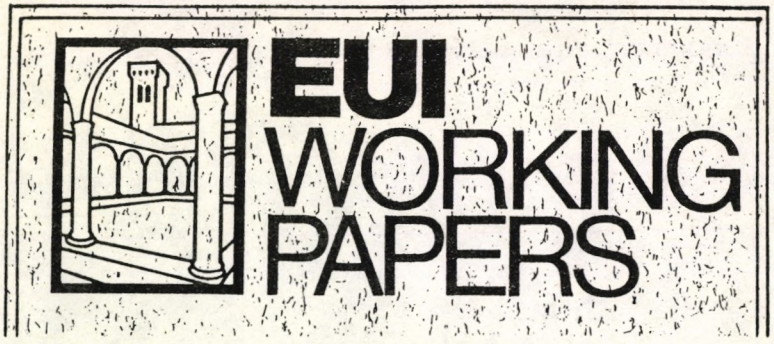

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